

ORE 608 Probability and Statistics for Ocean Engineers

Designation

Elective Course

Catalog Description

Probability and statistical analysis including distributions, multiple regression and correlation, autocovariance, cross-spectra, and practical applications in ocean engineering. Pre: 607 or consent.

Prerequisites by Topics

Calculus

Probability and statistics

Water wave mechanics

Textbooks

None

Reference books

1. *Data Analysis Methods in Physical Oceanography* - Emery and Thomson
2. *Extreme Value Theory in Engineering* - Castillo
3. *Numerical Recipes* - Press, Flannery, Teukolsky, and Vetterling
4. *Probability, Random Variables, and Stochastic Processes* - Papoulis
5. *Random Data: Analysis and Measurement Procedures* - Bendat and Piersol
6. *Spectral Analysis and Its Applications* - Jenkins and Watt
7. *Spectral Analysis for Physical Applications* - Percival and Walden
8. *Spectral Analysis and Time Series* - Priestley
9. *The Fourier Transform and Its Applications* - Bracewell

Course Objectives

To provide an overview of statistical methods with applications using real data sets from the fields of oceanography and ocean engineering.

Topics Covered

Random Variables

Probability Density Functions

Moments and Expected Values

Statistics of Extreme Events

Estimation and Sample Distributions

Confidence Intervals

Hypothesis Testing

Regression and Correlation

Degrees of Freedom

Monte Carlo Methods

Stochastic Processes

Fourier Analysis

Auto-Spectra

Rotary Spectra

Cross-Spectra

Digital Filters

Complex Demodulation

Empirical Orthogonal Functions

Assessment

50% Homework

20% Midterm Exam

30% Final

Usage of Engineering Tools and Computers
Matlab

Schedule

Two 1.25-hour sessions per week.

Contribution to Professional Component

Engineering Science: 3 credits

Relationship to Program Outcomes

Program Outcome 2: Basic science, mathematics, & engineering

Program Outcome 5: Use of latest tools in ocean engineering

Program Outcome 6: Problem formulation & solution

Prepared by

M.A. Merrifield, Spring 2003